

Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11) **EP 0 998 947 A1**

(12)

**EUROPEAN PATENT APPLICATION**

published in accordance with Art. 158(3) EPC

(43) Date of publication:

10.05.2000 Bulletin 2000/19

(21) Application number: 97926011.4

(22) Date of filing: 18.06.1997

(51) Int. Cl.<sup>7</sup>: **A61L 9/03**, A01M 1/20

(86) International application number:  
PCT/ES97/00157

(87) International publication number:  
WO 98/57674 (23.12.1998 Gazette 1998/51)

(84) Designated Contracting States:  
DE FR GB GR IT PT

(71) Applicant: DBK Espana, S.A.  
08290 Cerdanyola del Valles (ES)

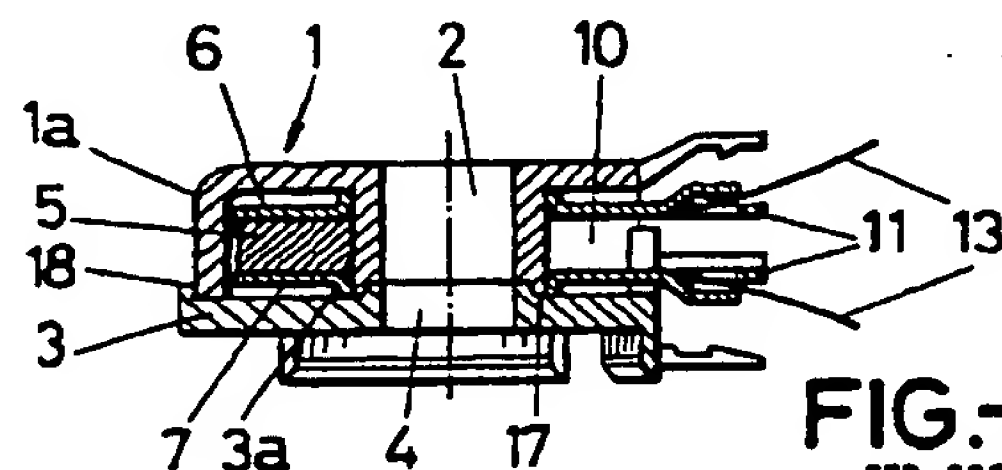
(72) Inventor:  
BASAGANAS MILLAN, Jordi,  
DBK Espana, S.A.  
E-08290 Cerdanyola del Vallés (ES)

(74) Representative:  
Carpintero Lopez, Francisco  
HERRERO & ASOCIADOS, S.L.  
Alcalá, 21  
28014 Madrid (ES)

(54) **NEW ELECTRIC HEATING DEVICE WITH EMISSION OF ACTIVE SUBSTANCES**

(57) **New electric heating device to release active substances.** A housing (1) and cover (3) have holes (2) and (4) to receive a wick that is to be heated soaked in a liquid that is to be evaporated. The housing (1) receives a pill-shaped PTC element (5) which is held pressed between two electrodes (6) and (7) having a high heat conducting coefficient.

The invention applies to the manufacture of devices for evaporating active substances, advantageously obtained from a small number of parts, and with electrodes of suitable material and structure to provide a uniform heating of the round body which receives the wick carrying the means that are to be evaporated.



**FIG.-3**  
III-III

EP 0 998 947 A1

## Description

[0001] The present Patent of Invention relates to a new electric heating device to release active substances that, in addition to the function for which it was designed, affords a number of advantages discussed below and others that are inherent in its organisation and construction.

## BACKGROUND OF THE INVENTION

[0002] Several state-of-the-art devices exist that are used for evaporating aromatic or active substances, for instance insecticides or fragrances, equipped with electric heating designed to nonpermanently release the active substances, only in case of need.

[0003] The aromatic or active substances can thus be supported by solid materials or be liquid.

[0004] Several state-of-the-art devices are known, for instance disclosed in registrations such as European Patent 90121288.6, Utility Model no. 9203290/7, Utility Model 9501364/4, and others.

[0005] Due to their design, state-of-the-art devices have two drawbacks worthy of note, one of which is the large quantity of constituent parts they have, with the ensuing costs derived from the moulding or manufacturing process of said parts. A second drawback is due to the substantial degree of difficulty the mounting process represents, which poses problems in connection with an automated mounting.

[0006] That is why said heating elements are expensive and hence barely competitive as compared with other conventional apparatus designed for similar purposes.

[0007] Another drawback of the state of the art is the absence of specific means devised for an easy, optional connection of additional elements, such as timers, adjusters, and others.

## SUMMARY OF THE INVENTION

[0008] The company applying for the present Patent of Invention has used its expertise in the manufacture of devices of this kind, to devise heating means to heat a body having a round shape, and provided with a hole to receive the wick carrying a means to be evaporated.

[0009] A first object of the invention is to achieve an arrangement of the kind aforesaid, designed so as to have a small number of constituent parts, which are sandwiched together in order thereby to provide a fully automatic assembly, which results in substantial costs savings.

[0010] A second object of the invention is to provide said device with heating means that use up little electricity in operation and produce a homogeneous heating, irrespective of the supply voltage.

[0011] This second object is achieved using a PTC

element for the heating to render the quantity of electric power released and the supply voltage independent from each other, due to the peculiar PTC characteristics, which self-stabilise and control temperature within a very wide voltage field.

[0012] The invention successfully solves the problem that usually arises when PTC elements are employed, for, being very small components, approximately with a diameter of eight millimetres and a thickness of three millimetres, the transfer of heat energy is locally limited.

[0013] Because in the device subject of the invention, the round body, which receives the means to be evaporated, must be heated as uniformly as possible, a special shape and material is used for the electrodes, which are ring-shaped in order to encircle the hole that is to be heated, and made of a material of good heat-conducting characteristics.

[0014] This organisation allows a single PTC element to be used to supply power with the ensuing economic savings.

[0015] In spite of the power concentration at the PTC location, a very uniform heating is achieved to meet requirements, given the characteristic that the electrodes fully surround the hole that is to be heated.

[0016] The improvements in accordance with the present Patent of Invention offer the advantages described hereinbefore and others that will follow easily from the embodiment of a device provided with electric heating having the said improvements that is described hereinafter in further detail for an easier understanding of the characteristics set out above, concurrently referring to a number of details, to which end a number of drawings are attached to the present specification which represent a practical embodiment of the present invention, merely as an example that is not intended to limit the same.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0017] In the drawings:

Figure 1 is a top plan view of the device having the improvements subject of the invention.

Figure 2 is a side elevation view of the device of figure 1.

Figure 3 is a cross-section of the device along III-III. Figures 4, 5 and 6 illustrate the electrode respectively in accordance with plan, side and diametrical cross-section views.

Figure 7 is a plan view of the electrode, in accordance with an alternative embodiment designed for it to be connected to printed circuit board contacts.

Figure 8 is a cross-section overview of the device, in accordance with the bulb and printed circuit connection variant.

Figures 9, 10 and 11 show the printed circuit board respectively in accordance with front, rear and side

views.

## DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

[0018] As shown in the drawings, the device equipped with electric heating to release active substances in accordance with the invention and in accordance with an embodiment thereof, comprises a housing made of a moulded plastics material, generally designated -1-, with an axial through hole, -2-.

[0019] The housing -1- has a circular shape in plan view, with a perimetric skirt -1a- that is closed with a part -3- that serves as a cover, is similarly circular and has a central hole -4- coinciding with the hole -2-. In order to obtain a lasting closure, the cover -3- and the base of the housing -1- are joined by ultrasonic soldering.

[0020] This ultrasonic soldering provides a seal between parts -1- and -3- at areas designated -17- and -18-. The seal -17- serves a safety purpose in order to avoid leakage of electric current towards the wick supporting the substance to be evaporated, which constitutes a conducting element because it is moist. The seal -18- provides a watertight seal to insulate the components located within the housing -1-3-.

[0021] The holes -2- and -4- of the housing -1- and cover -3- establish an axial passage into the unit to receive a wick that is to be heated, not shown, soaked in a liquid that is to be evaporated.

[0022] A pill-shaped PTC element, designated -5- is located within the unit formed by the housing -1- and cover -3-. This element -5- is mounted between two twin contacts, designated -6- and -7-, made of a material with good heat conduction characteristics shaped as an annulus, as shown in figures 4, 5 and 6. The central hole -8- of said contacts has a diameter equivalent to the wall of the through hole -2-4-, thereby encircling said wall throughout the circumference, in order to provide a homogeneous heat distribution. The said contacts -6- and -7- have an edge -9- around the central hole -8- to offer a greater interface with the wall of the through hole -2- and -4-, thereby improving the heat performance.

[0023] In order to prevent the contacts from touching one another at the point diametrically opposite the PTC element, causing a short circuit, supports -10- are provided inside the base to hold the distance given by the thickness of the PTC element between the contacts -6- and -7-.

[0024] In order to ensure the required pressure between the contacts -6- and -7- and the PTC element -5-, three coil-like elements -3a- are provided integral with the cover -3-. These elements -3a- are pressed against the top contact, transmitting a biasing force throughout the unit. The contacts -6- and -7- have a tab -11- on the side opposite the extension -12-, for locating the PTC element, which tab serves to connect the conducting wire -13-. This wire -13- is inserted under the

tab, as shown in figure 4, which is then folded over the wire, thereby ensuring a bond between both components.

[0025] If contact is made through a printed circuit board -15-, connection is made through spear-shaped terminals -14- which are snapped into the space left between the electrodes -6- and -7-, and the housing -1- and cover -3-, respectively, making contact with the tab -19- of the relevant electrode, which tab is shorter in this case, as illustrated in figure 7.

[0026] The printed circuit -15- optionally allows the inclusion of sundry electric devices, namely for instance a timer, adjuster, etc.

[0027] In accordance with the description, an arrangement is obtained that works using up very little electricity to produce a homogeneous heating, irrespective of the supply voltage.

[0028] The arrangement is convenient in that it comprises only five parts which are sandwiched together, thus allowing an automatic mounting and at the same time an enhanced safety of the element at issue, concurrently resulting in substantial cost savings.

[0029] In accordance with the above, in said mounting the PTC element -5- is located between the two contacts -6- and -7- such that the contacts and the PTC element take up a position parallel to the cover -3- and the inner surface of part -1-.

[0030] The invention can, observing its essence, be otherwise embodied in practice, with details differing from the embodiment set out as an illustration in the description, and which shall also be covered by the protection applied for herein. It can therefore be constructed in any form and size, with the most suitable materials, since lying within the spirit of the claims.

## Claims

1. A new electric heating device to release active substances, of the kind comprising a housing with electric heating to be associated to a container that carries the substance that is to be evaporated, which container includes, in the event of a liquid being contained, porous materials, namely ceramic or fibre wicks for instance, through which the liquid rises due to capillarity towards the heating through a duct of suitable cross-section for the wick, essentially characterised in that it consists of a limited number of moulded material parts, which are automatically assembled to make up a compact sandwiched package, part (1) making up the housing as such, which is circular in plan with a perimetric skirt (1a), closed at the mouth by a part (3) serving as a cover, both parts (1) and (3) having respective axial through holes (2) and (4) which establish a tubular housing to receive a wick to be heated soaked in a liquid to be evaporated, the said parts (1) and (3) establishing an annular enclosure which houses a cylindrical pill-shaped PTC element (5), pressed

between two twin contacts (6) and (7) of a material having good heat conduction characteristics, which contacts are shaped as an annulus, tightly encircling the outer wall of the axial passage consisting of the holes (2) and (4), in order to provide a homogeneous heat distribution, said contacts including an edge (9) to provide a greater supporting surface with the outer wall of the axial hole (2).

2. A new electric heating device to release active substances, as in the preceding claim, **characterised** in that supports (10) exist at the point diametrically opposite the location of the PTC element (5) to hold a distance between the contacts equivalent to the thickness of the PTC element.
3. A new electric heating device to release active substances, as in claims 1 and 2, **characterised** in that the contacts (6) and (7) have respective tabs (11) extending radially to a length sufficient to project beyond the structure which consists of the housing (1) and cover (3), in order to allow the conductors (13) to be connected.
4. A new electric heating device to release active substances, as in claims 1 and 2, **characterised** in that the contacts (6) and (7) have respective tabs (19) whose dimension is comprised within the limits of the structure consisting of the housing (1) and cover (3), which parts and the tabs of the respective contacts each result in housings to receive spear-shaped terminals (14) fixed by elastic resilience.
5. A new electric heating device to release active substances, as in claims 1 to 4, **characterised** in that the number of constituent parts of the device is five.

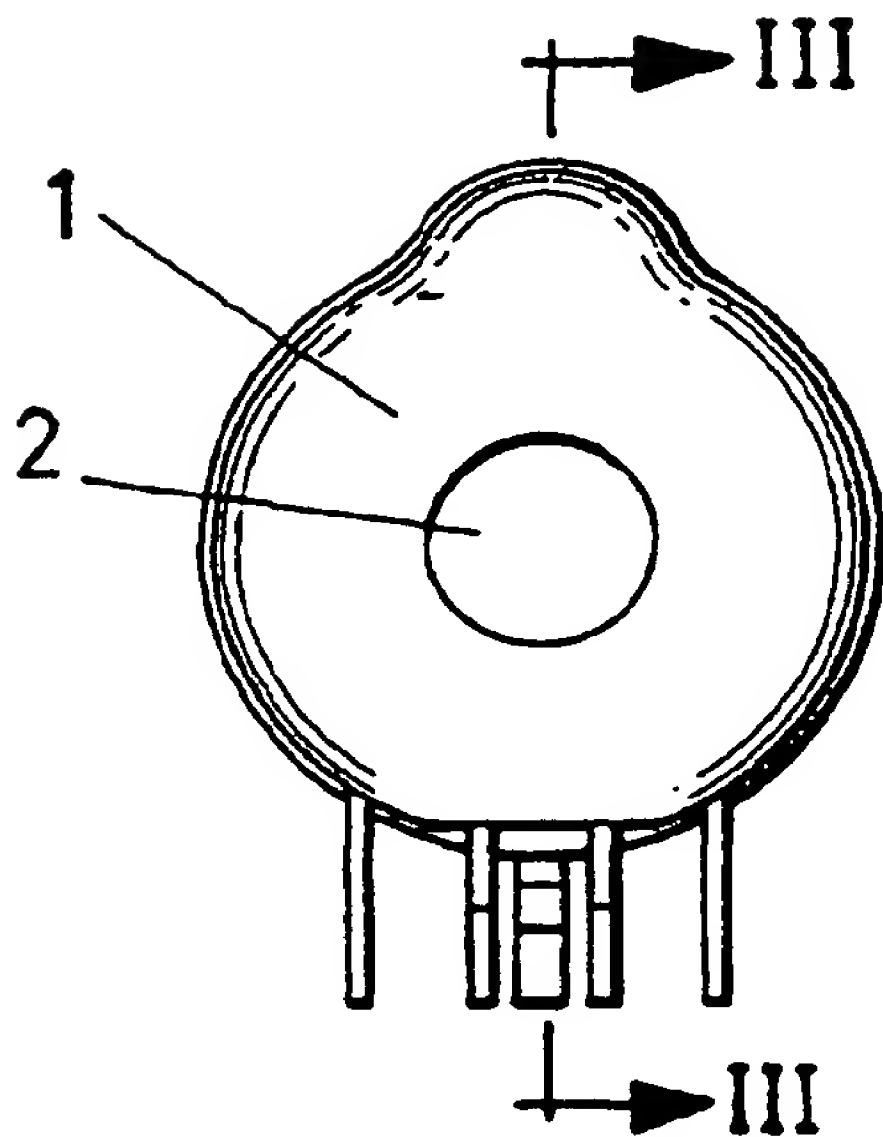


FIG.-1

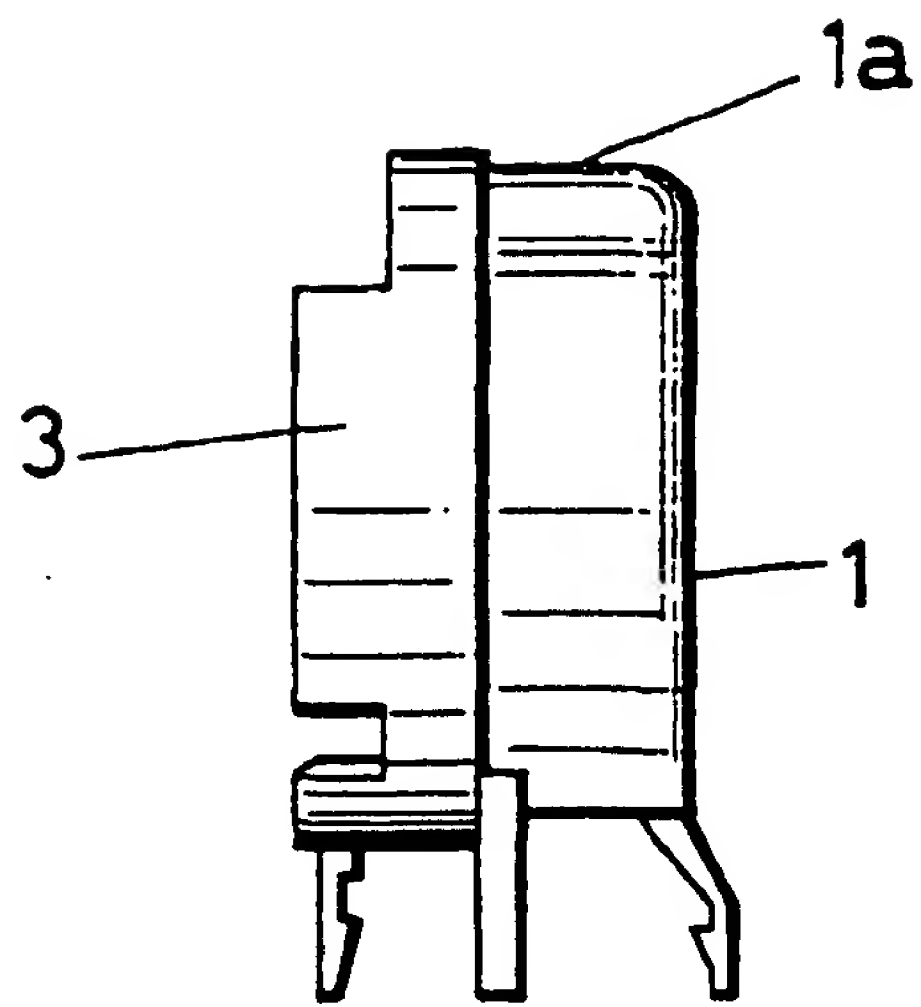


FIG.-2

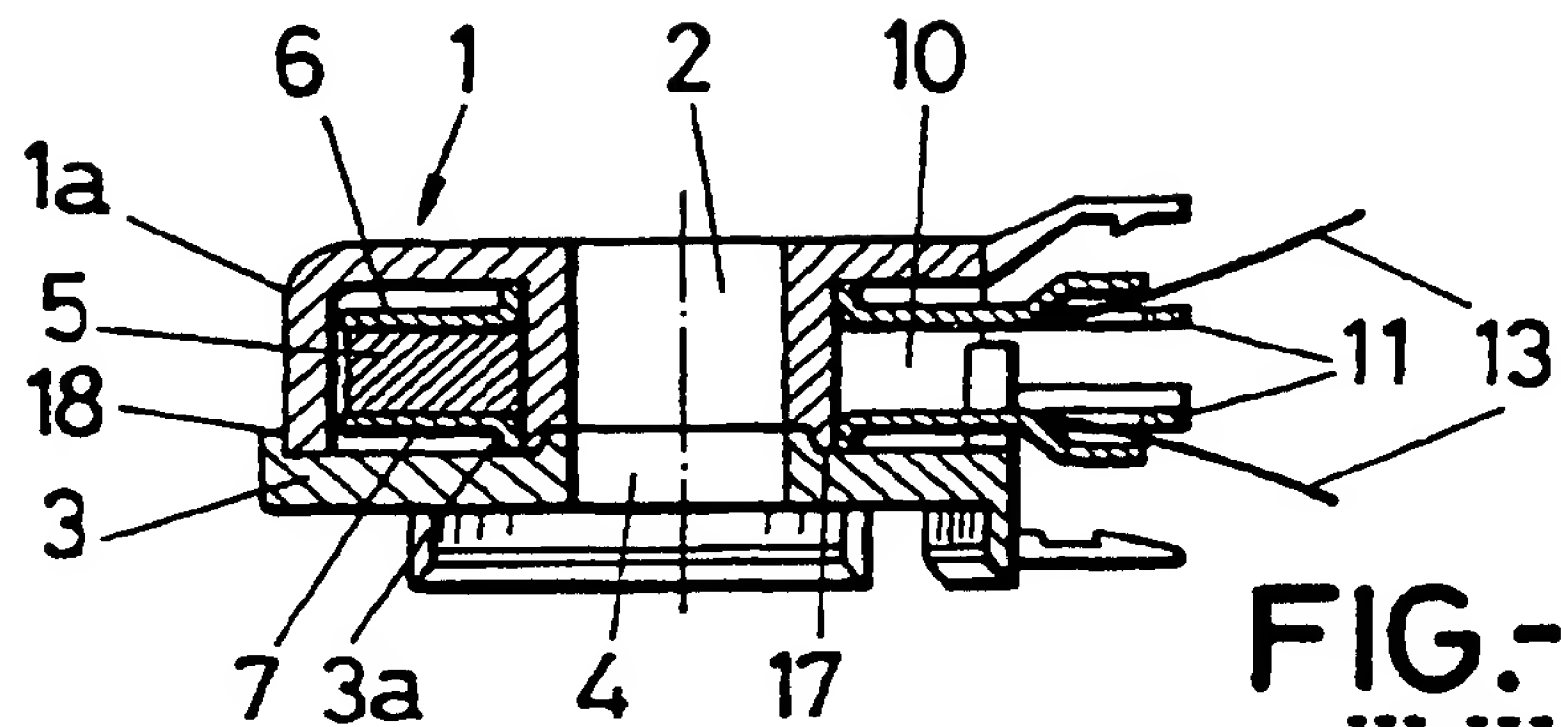


FIG.-3  
III-III

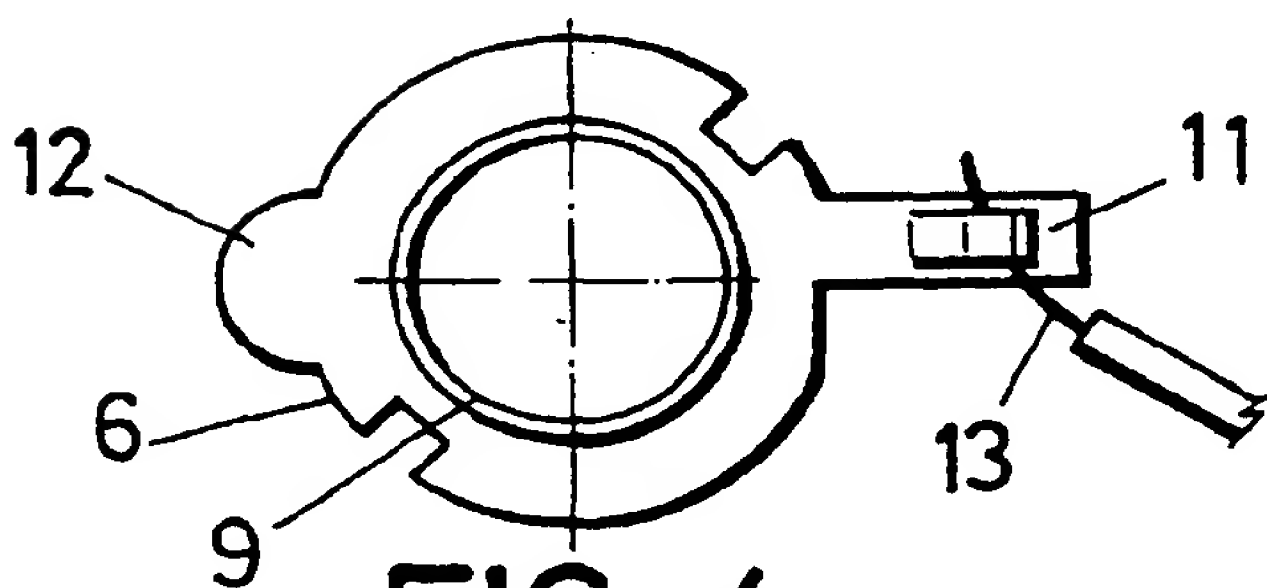


FIG.-4

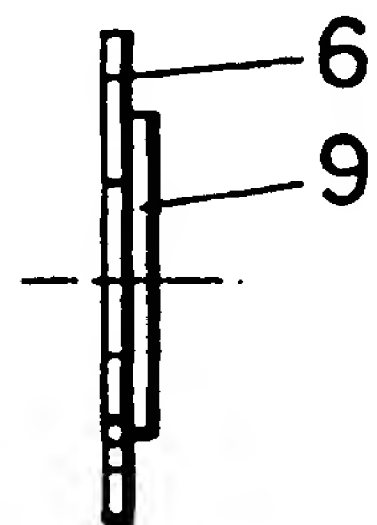
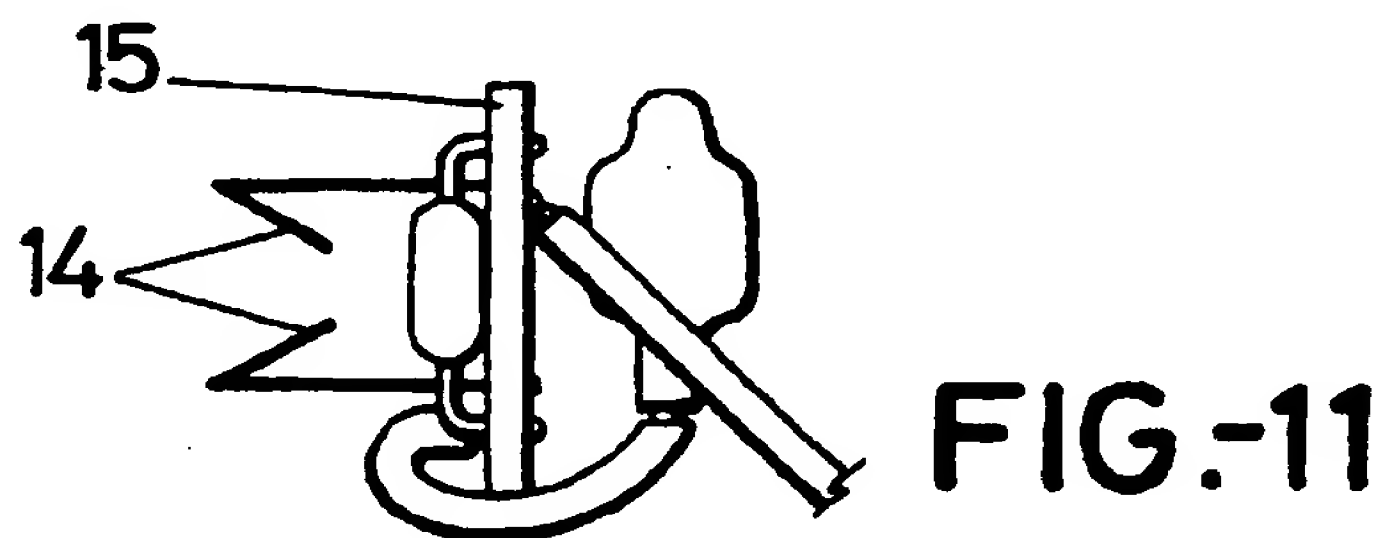
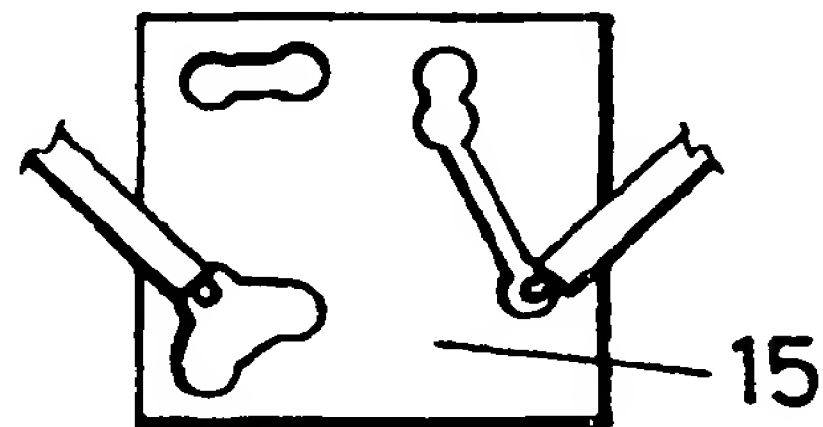
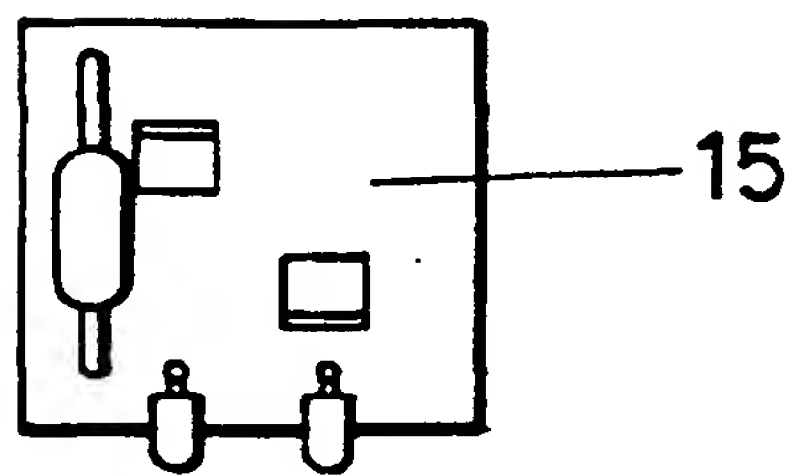
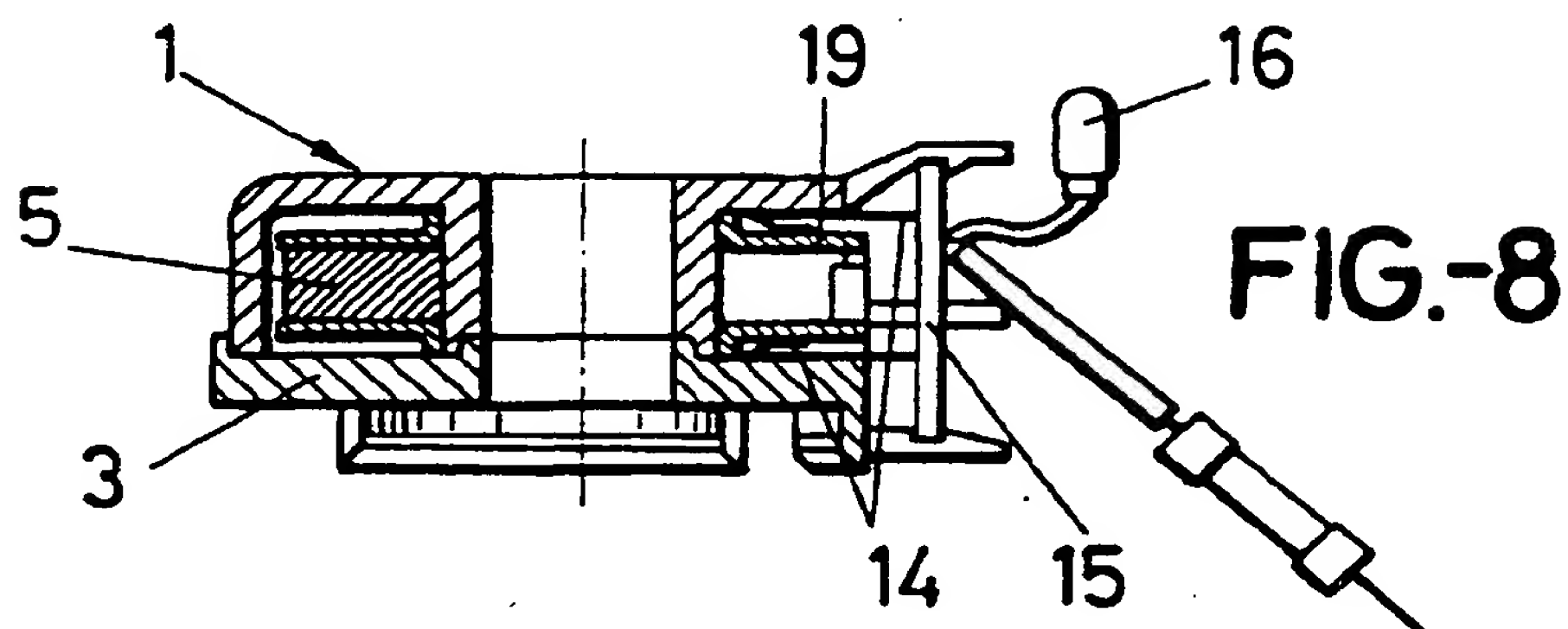
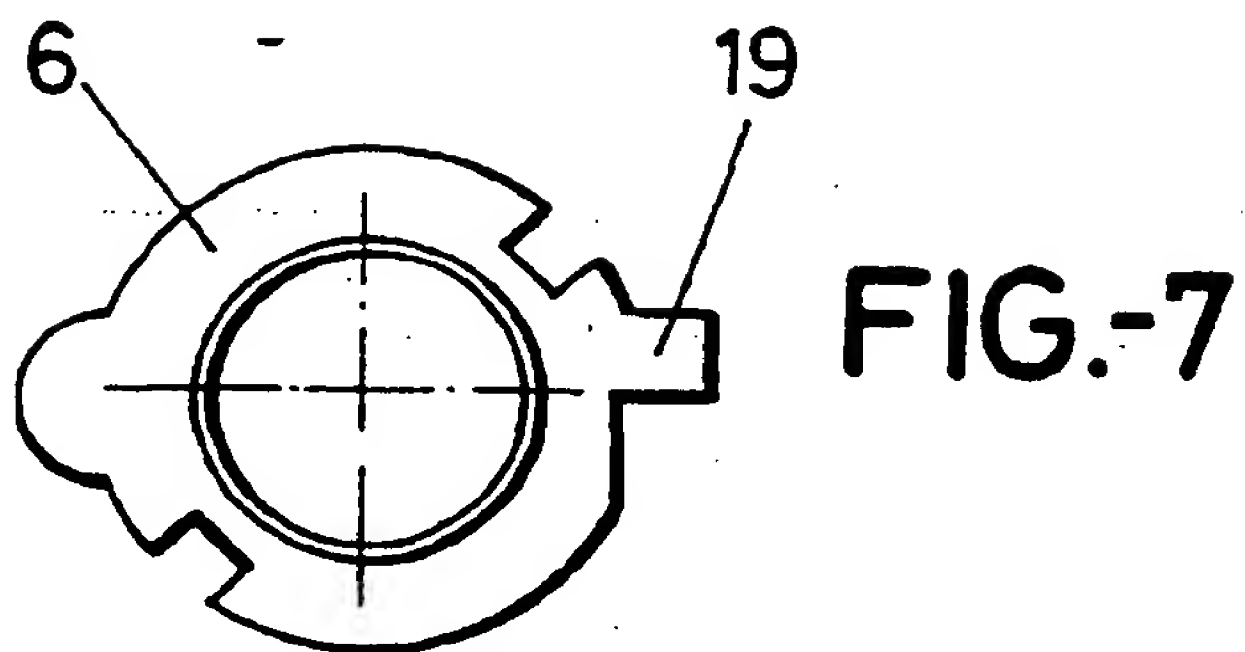


FIG.-5



FIG.-6





## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 97/00157

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61L 9/03 A01M 1/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61L A01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP-0290159-A(TDKCORP; FUMAKILLA LTD) 9 November 1988 see column 1, line 39 see column 2, line 17; see column 6, line 16-linea 29; figures 2-5	1-5
Y	PATENT ABSTRACTS OF JAPAN vol.016. No. 469 (E-1271), 29 September 1992 & JP-4167391-A (MATSUHITA ELECTRIC IND CO LTD.) 15 June 1992 see abstract	1-5
A	WO-9702054-A (ZOBEL IND CHIM) 23 January 1997 see page 4, line 13 see page 5, line 1; figures 1-5	1-5
A	EP-0695553-A (STEINEL GMBH & CO KG) 7 February 1996 see column 4, line 22 - line 37; figure 6	1-5

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

15 September 1997 (05.09.97)

Date of mailing of the international search report

22 September 1997 (22.09.97)

Name and mailing address of the ISA/

Facsimile No. S.P.T.O

Authorized officer

Telephone No.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 97/00157

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE-9104709-U (DAVID + BAADER-DBK GMBH) 6 June 1991 see claims 1-8; figures 1-3	1-5
A	ES-1024793-U (DAVID + BAADER-DBK GMBH) 16 October 1993 cited in the application see page 2, line 19 see page 3, line 14, figure 1	1-5

Form PCT/ISA/210 (continuation of second sheet) (July 1992)



**INTERNATIONAL SEARCH REPORT**  
 Information on patent family members

 International Application No  
**PCT/ES 97/00157**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0290159 A	09-11-86	AU 605277 B AU 1479838 A CA 1267031 A CN 1030503 A,B DE 3852519 D DE 3852519 T ES 2068825 T KR 9607869 B US 4874924 A	10-01-91 27-10-88 30-07-91 18-01-89 02-02-95 10-08-95 01-05-95 15-06-96 17-10-89
WO 9702054 A	23-01-97	IT M:950475 U	07-01-97
EP 0695553 A	07-02-96	AU 3165795 A CA 2196665 A WO 9604022 A	04-03-96 15-02-96 15-02-96
DE 9104709 U	06-06-91	NONE	
ES 1024793 U		NONE	